using Ingenix® data (2002-05). The analysis included elderly individuals aged ≥65 years (47.9% females) on oral treatment for diabetes (insulin users excluded), classified as SU users (n=20,741) and non-users (n=22,114) at baseline. **RESULTS:** During the follow-up, we identified 420 cases of incident hip fractures in the SU group and 228 in non-SU group; unadjusted odds ratio (OR) for hip fracture risk was 1.98 (95% confidence intervals [CI]:1.69-2.33). In a multivariable logistic regression analysis simultaneously accounting for propensity to use SU and for potential confounders (age, gender, health insurance, geographic region, CVD, stroke, osteoporosis, dementia, hypertension, and use of steroids, benzodiazepines, anti-depression, anti-psychotic, anti-convulsant therapy and treatment for osteoporosis), the adjusted OR was 1.60 (95%CI: 1.35-1.90). This association was similar among men (210 cases; OR=1.68; 95%CI: 1.24-2.26) and women (438 cases; OR: 1.56; 95%: 1.27-1.92). In addition, SU users also had higher risk of hypoglycemia compared to non-users (5.8% vs. 2.1%). Furthermore, hypoglycemia was more common among hip fracture cases (12.0%) compared to non-cases (3.8%); the multivariable OR for hypoglycemia-fracture association adjusted for the above covariates was 1.81 (95% CI: 1.40-2.34). **CONCLUSIONS:** These results suggest that SU may be associated with increased risk of hip fracture in elderly men and women with diabetes, possibly related to elevated risk of hypoglycemia-induced falls. These findings need to be confirmed in future studies which should also further investigate the interrelationships of SU use with hypoglycemia, falls and fractures.

RM4

EXTERNAL VALIDATION OF THE RISK-PREDICTION MODEL FOR HEPATOCELLULAR CARCINOMA [HCC] FROM THE REVEAL HCV STUDY

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OBJECTIVES: Evaluate the external predictive power of the REVEAL HCV risk-prediction model for HCC using data from the Veterans' Administration [VA]. **METHODS:** The REVEAL investigators in Taiwan developed a risk-prediction model for HCC which has not been validated outside of Taiwan. The VA maintains a Clinical Case Registry [CCR] for approximately 360,000 patients with HCV infections which summarizes the utilization, diagnostic and lab value data for each patient going back to 1999. The patient's initial HCV diagnosis date is set as the index date. VA patients were selected using the REVEAL inclusion/exclusion criteria and were then screened for baseline [+/- 6 months of index date] data on ALT, ALT/AST ratio, cirrhosis, HCV viral load and genotype. The area under ROC was used to evaluate the performance of the risk models. **RESULTS:** A totoal of 47,578 VA HCV patients met study inclusion criteria. The VA sample varied significantly from the REVEAL sample in terms of male gender and race. The frequency of a baseline viral load > 23,000 IU/mL was 91% in the VA sample versus 35% Taiwan sample. The overall incidence of HCC following a 5-year washout period was 2.1% [n=1,000]. Average REVEAL HCV risk scored 13.2 [SD=2.4] for non-HCC patients and 14.9 [SD=2.4] in patients with HCC [p<0.0001]. The incidence of HCC in VA patients increased monotonically across risk score quintiles: 0.48% for the lowest quintile to 4.3% for the highest quintile of risk scores. The area under the ROC was 0.6924 when the REVEAL HCV model was applied to VA patients. **CONCLUSIONS:** HCV risk prediction models help physicians to identify and motivate high risk patients to initiate treatment. The REVEAL risk prediction model is robust even when used for VA patients who differ significantly from the Taiwan sample from which the risk score model was estimated.

PODIUM SESSION III: SELECTION BIAS STUDIES

SB1

BURDEN OF SCHIZOPHRENIA ON SELECTED COMORBIDITIES COSTS

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OBJECTIVES: To evaluate health care costs of patients with schizophrenia and specific comorbidities relative to patients without schizophrenia with the same comorbidities. **METHODS:** Medicaid insurance claims databases from five states (from 2001-2010) were analyzed. Adults with ≥2 claims for schizophrenia, ≥12 months of continuous eligibility prior to the first diagnosis (index date), and ≥1 claim for important comorbidities (substance abuse, obesity, diabetes, metabolic syndrome, hyperlipidemia, hypertension, coronary artery disease, congestive heart failure, HIV, hepatitis C, and COPD) during the 12 months prior to the index date (baseline period) were selected. Patients with schizophrenia were matched 1:1 with non-schizophrenia control patients based on baseline characteristics (propensity scores) and comorbidities common in schizophrenia (exact matching factors). All-cause and comorbidity-related monthly health care costs were calculated and compared between cohorts using nonparametric re-resampling methods. No adjustment was made for multiplicity. **RESULTS:** A total of 24,652 schizophrenia and 24,652 patients without schizophrenia were matched. The most common comorbidities were hypertension (48.8%), substance abuse (39.1%), and diabetes (28.4%). The patients with schizophrenia incurred greater all-cause monthly health care costs (cost difference [95% CI], $978 [933-1,024]) and comorbidity-related costs (cost difference [95% CI], $288 [269-307]). Schizophrenia was also associated with significantly higher comorbidity-related costs in each comorbidity subgroup (among the three most common comorbidities: 99% higher in hypertension, 293% in substance abuse, and 105% in diabetes). **CONCLUSIONS:** This study show that patients with schizophrenia and comorbidities common in patients with schizophrenia had higher all-cause and comorbidity-related health care costs compared with patients without schizophrenia with the same comorbidities.

SB2

MEDICAL, DRUG, AND WORK-LOSS COSTS OF DIABETIC FOOT ULCERS

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OBJECTIVES: Estimate annual per-patient medical, drug, and work-loss costs of diabetic foot ulcer (DFU) using de-identified administrative claims data. **METHODS:** DFU patients and non-DFU diabetic patients (controls) were identified using two databases: ages 65+ from a 5% random sample of Medicare beneficiaries (Standard Analytical Files, 2007-2010; DFU N=29,681, controls N= 201,757) and ages 18-64 from a privately-insured population (OptumInsight, 2007-2011; DFU N=5,681, controls N=113,337). Patients were required to be continuously eligible during the 12 months before (baseline) and 12 months after (study period) the index date (ie, the date of the most recent DFU diagnosis following 12 months without DFU diagnoses (DFU group); or the date of a random medical claim (controls)). DFU patients were matched to controls using propensity scores to account for baseline differences in demographics, comorbidities, resource utilization, and costs. Medical costs during the study period were calculated for both Medicare and privately-insured patients. Because drug and work-loss (absenteeism or disability) data were not available for Medicare patients, these costs were estimated for the privately-insured sample only. Wilcoxon signed-rank tests were used to compare differences in study period costs. **RESULTS:** Data for 4,536 matched pairs of privately-insured and 27,878 matched pairs of Medicare patients were analyzed. Incremental medical costs for DFU patients were $11,296 for Medicare ($27,040 vs $15,743) and $15,329 for privately-insured ($25,931 vs $10,602) patients. Two-thirds (66%) of the cost differential among the privately-insured was attributable to excess inpatient costs. For Medicare, all places of services (eg, inpatient, outpatient/physician, emergency department) contributed approximately equally to the medical cost differential. Among the privately-insured, DFU patients had excess drug costs of $958 ($4,377 vs $3,420) and excess work-loss costs of $3,053 (absenteeism: +$1,490, disability: +$1,564). (Comparisons significant at p<0.0001.) **CONCLUSIONS:** These findings suggest that presence of DFU imposes substantial burden on payers beyond that of standard diabetes care.

SB3

THE PREVALENCE OF OPIOID-RELATED MAJOR POTENTIAL DRUG-DRUG INTERACTIONS AND THEIR IMPACT ON HEALTH CARE COSTS

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OBJECTIVES: Previous research demonstrated that in some patients taking opioid analgesics for chronic pain there were significantly higher costs among those with concurrent exposures to CYP450-metabolized medications with the potential to cause a drug-drug interaction (pDDI), compared to matched patients without such exposures. The objectives of this study are to evaluate the prevalence of and health care costs associated with pDDIs that may cause major interactions in patients chronically taking long-acting opioid (LAO) analgesics. **METHODS:** Using the MarketScan® Commercial Database (2008-2010), cohorts were constructed of patients who were dispensed LAOs for >=30 days, both with and without pDDI exposures. Propensity score matching was used to mitigate the impact of selection bias. Costs were analyzed with a linear model for differences and a generalized linear model for ratios. **RESULTS:** Based on the final sample of 57,752 patients, the prevalence of major pDDIs was 5.7% in the 90-day observation period. Oxycodone was the most common opioid among these pDDIs pairs, accounting for 57.3% of patients, followed by fentanyl (32.9%), methadone (18.3%) and codeine (1.8%). The most common precipitant drugs were fluconazole (34.5%), diltiazem (14.0%), clarithromycin (11.4%) and verapamil (10.9%). Based on the 99th percentile cost cutoff in the propensity score matched cohorts, the estimated mean monthly overall health care costs from the multivariate linear model were $3366 and $2757 for the pDDI-major cohort and no-pDDI cohort, respectively, a $609 difference. The generalized linear model provided similar results, with an estimated cost ratio of 1.232 (p-value < 0.01). The difference in monthly health care cost was mainly driven by outpatient medical cost ($257 difference, ratio 1.219, p- value <0.01) and inpatient medical cost ($289 difference, p-value = 0.11). **CONCLUSIONS:** Among patients chronically taking LAO analgesics, the exposure to major pDDIs is costly and worthy of efforts to avoid such exposures.

SB4

TIME-SPECIFIC PROPENSITY SCORE ANALYSIS FOR OBSERVATIONAL STUDY: A CASE STUDY ESTIMATING THE EFFECTIVENESS OF THIAZOLIDINEDIONE USE

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OBJECTIVES: Propensity score (PS) is widely used in observational study. It is usually estimated over entire study time period. However, pattern of medication use is changed over time. The PS which is estimated without taking into account time might be biased. Little is known about the effects of time on propensity score. This study aims to determine the differences of PS estimated by conventional PS and time-specific PS approaches and their effects on estimates of treatment effects. **METHODS:** A retrospective database analysis at a University-affiliated hospital in Thailand was used. Patients who aged 18 years

or older and were diagnosed as diabetes during July 2008 – June 2011 with receiving glucose lowering agent were included. All included patients were categorized into thiazolidinedione (TZDs) and non-TZDs groups. PS were estimated by conventional and time-specific approaches. In the time-specific approach, PS was separately estimated into 3 groups by calendar time. The pair t-test was used to compare the PS of both approaches. Patients were matched using caliper nearest neighbor matching with no replacement. The multivariate Cox proportional hazard model was used to determine the adjusted hazard ratio of cardiovascular hospitalizations of TZDs and non-TZDs in matched cohorts. **RESULTS:** A total of 2165 patients were included in this study. Patients were on average 58.8 ± 12.7 years of age with 44.5% of male. The average conventional PS was 0.198, which was significantly lower than the average time-specific PS of 0.209.For CVD-related hospitalization, the adjusted hazard ratio (HR) of conventional PS-matched cohort was 1.05 (95% confidence interval (CI); 0.38 – 2.89), while that of time specific PS-matched cohort was 1.12 (95%CI; 0.43 – 2.92). **CONCLUSIONS:** Propensity scores estimated by conventional and time-specific approaches were different. The different PS approaches could lead to different estimates of treatment effects.

RESEARCH POSTER PRESENTATIONS – SESSION I
RESEARCH ON METHODS STUDIES

RESEARCH ON METHODS – Clinical Outcomes Methods

PRM1

THE IMPLICATIONS OF EVALUATING MEDICATION ADHERENCE AT DIFFERENT DRUG CLASSIFICATION LEVELS

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OBJECTIVES: Proportion of days covered (PDC) has gained increased popularity as a key measure of medication adherence. The Centers for Medicare and Medicaid Services (CMS) now uses PDC to measure medication adherence for quality improvement in Medicare Part D. PDC can be calculated at various drug classification levels such as a particular drug (e.g. metformin, glipizide) or a broad therapeutic class (e.g. all oral anti-diabetes drugs). The objective of this analysis is to show how PDC calculations at different drug levels can result in varied adherence estimates. **METHODS:** The analysis used a sample of claims data for all oral anti-diabetes drugs from a national pharmacy and defined drug levels using Medispan's Generic Product Identifiers (GPI). Three methods were used to calculate PDCs. In method 1, PDC was computed for each GPI6, and then rolled up to the patient level using weighted averages. In methods 2 and 3, PDC was calculated for the entire therapeutic area of oral anti-diabetes drugs. Method 2 used GPI6, and method 3 used GPI10 to determine the drugs; any medication overlaps between different drugs were ignored to avoid double counting and any medication overlaps within the same drug were pushed out to make adjustment in the days covered. **RESULTS:** PDC was 0.64 for method 1 and 0.69 for both methods 2 and 3. Compared to method 1, PDCs from method 2 and 3 were 5% higher (N= 188,121, *P-value* < 0.0001). Among patients with 1 or more distinct GPI6s, the difference was even bigger – PDCs from method 2 and 3 were 10% higher (N= 90,064, *P-value*< 0.0001) than that from method 1 (0.75 vs. 0.65). **CONCLUSIONS:** PDCs at varied drug levels could lead to different medication adherence estimates and impact conclusions about medication adherence, especially for patients who switch drugs within a drug class or use combination therapies.

PRM2

COMPARISON OF TWO METHODS FOR IDENTIFYING PROBLEMATIC OPIOID USE AMONG AN OPIOID-TREATED CHRONIC PAIN POPULATION

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OBJECTIVES: In recent years, addiction and problematic use of prescription opioid analgesic medications has increased. Using medical and pharmacy claims data, the purpose of this study was to compare two methods of characterizing problematic opioid use among a commercially insured chronic pain patient population. **METHODS:** A national managed care organization provided medical and pharmacy data for individuals with chronic pain and an opioid prescription fill during calendar years 2009-2011. Members were placed into one of two problematic opioid use groups based on the following criteria: "Doctor Shopping" (n = 552), defined as the filling of opioid prescriptions from five or more different prescribers within 12 months; and "Rapid Dose Escalation" (n = 741), defined as a 50% increase in opioid dose in the first 3 months of treatment, or 100% increase in dose during the 12-month post-period. Groups were compared on the patient characteristics of age, gender, Charlson Comorbidity, and region of residence, and on the change in health care service utilization and expenditure over an 18-month period. **RESULTS:** Members in the Doctor Shopping group were significantly more likely to be female than members in the Rapid Dose Escalation group (57.1% vs. 51.3%; $p < .025$), and also incurred significantly greater increases in emergency room charges ($810 vs. $265; $p < 0.005$). The two groups did not differ on any remaining demographics or service utilization estimates, including inpatient admissions, days, and costs; office visits and costs; outpatient hospital visits and costs; total prescription and opioid-specific costs and days' supply; total health care costs; and the Charlson (p's > 05). **CONCLUSIONS:** Results revealed only slight differences in demographic makeup and health care expenditure across the two problematic opioid use groups, suggesting the successful identification of a single, homogenous group. The use of either method alone would likely underestimate the prevalence of this burgeoning problem.

PRM3

THE EFFECT OF REDESIGNED COMPUTERIZED DRUG-DRUG INTERACTION ALERTS ON MEDICATION ERRORS AND PRESCRIBING EFFICIENCY

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OBJECTIVES: Computerized medication alerts, such as drug-drug interaction (DDI) warnings, are intended to improve decision-making at the time of prescribing and enhance patient safety. The alert interface influences prescribers' perceptions of warnings, but the interface design of DDI alerts is largely unstudied. The objectives were to conduct a simulation study to evaluate whether design changes reduce medication errors and improve prescribing efficiency. **METHODS:** We conducted a counterbalanced crossover study with outpatient prescribers to evaluate two different DDI alert designs. Redesigned alerts incorporated human factors principles such as guidelines for warning design; the original alert design served as the control. During the simulation, Veterans Affairs outpatient prescribers completed three fictional patient cases using both the original and the redesigned alerts. We used six clinically relevant DDI alerts of varying severity. Prior to data collection, each DDI was assigned correct and incorrect actions to evaluate medication errors. The primary outcome was medication errors defined as the number of incorrect actions over the number of alerts prescribers received. A secondary outcome was prescribing efficiency, defined as the time spent reviewing and resolving all alerts within one patient case. The original and redesigned alerts were compared using McNemar's test for medication errors and Wilcoxon signed-rank test for efficiency. **RESULTS:** Twenty prescribers (14 physicians, 4 pharmacists, and 2 nurse practitioners) completed patient cases for both designs. Medication errors were significantly reduced with redesigned alerts (27.5%) compared to the original alerts (47.4%; p<0.001). Median time spent on redesigned alerts was 52 seconds compared to 97 seconds for the original alerts (p<0.001), saving prescribers 45 seconds per case. **CONCLUSIONS:** Based on this simulation study, incorporating human factor principles into computerized medication alert systems may improve prescribing and patient safety. Evaluation of redesigned alerts in a clinical setting is needed to understand the effects during actual patient care.

PRM4

TO STUDY THE OUTCOME OF HOSPITALIZATION IN ISCHEMIC VERSUS HEMORRHAGIC STROKE

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OBJECTIVES: To assess and compare the functional outcome/recovery of ischemic and intracerebral hemorrhage at discharge from hospital, using modified rankin scale and barthel index. **METHODS:** In the present retrospective study, 140 stroke patients (110 patients of infarction including patients of Transient Ischemic Attack and 30 hemorrhage patients) were enrolled, their medical records studied and were compared for risk factors, disability at discharge, groups' length of stay and mortality. Mean scores on both, Modified Rankin Scale (mRS) and Barthel Index (BI) were determined at admission and discharge and then compared using paired ttest. Ischemic group was also sub-divided into 2 groups on the basis of treatment with tissue plasminogen activator (t-PA) and their scores were also compared with same test. Good (mRS score <2 and BI score > 60) or poor outcome (mRS score >2 and BI score < 60), were distinguished in both the stroke groups using on both scales. **RESULTS:** Ischemic stroke patients had higher mean score on Barthel Index (70.2, p=0.0026) and lower mean score on Modified Rankin Scale (2.3, p=0.000) at discharge compared to hemorrhage patients (BI score = 36.67 and mRS score = 3.7). Hypertension was determined as the most prevalent risk factor in both the stroke types. CAD, atrial fibrillation, previous stroke, diabetes mellitus, alcohol were other major factors. ~65% ischemic stroke patients were discharged with a good outcome whereas only 30% patients in the hemorrhage group were discharged with a good outcome. Patients treated with t-PA experienced better outcome than the patients managed conservatively. **CONCLUSIONS:** The results provide evidence of better functional outcome and recovery in ischemic stroke patients at discharge and greater risk of mortality in patients with intracerebral hemorrhage.

PRM5

COMPOSITE ENDPOINTS IN TREATMENT OF TYPE-2 DIABETES

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OBJECTIVES: Composite endpoints (CEPs) are being used more frequently in describing outcomes for trials of drugs in type-2 diabetes. We reviewed the literature on CEPs to determine how they have been used to date on currently marketed antidiabetics. **METHODS:** Medline, Embase and Cochrane databases and Clinicaltrials.gov were searched for randomized controlled Phase-3 trials of currently marketed incretins, which were grouped by class. We sought trials of GLP-1 agonists, DPP-4 inhibitors and SGLT-2 inhibitors. CEPs used were identified as well as numbers and percentages of patients achieving each, the time of measuring the CEPs and the comparison drugs involved in those trials. **RESULTS:** Twelve studies involving 5611 patients provided data. Drug classes included GLP-1 agonists (exenatide 10 mcg twice daily, exenatide 2 mg weekly, liraglutide 1.2 mg daily, and liraglutide 1.8 mg daily), DPP-4 inhibitors (sitagliptin 100 mg daily). No studies were found in the literature reporting CEPs for SGLT-2 inhibitors. Approximately 18% of patients were treated as first line therapy, 55% as second line, and 27% as third. Active comparison drugs and background treatments included insulin, metformin, sulfonyluyreas, and thiazolidinediones. Eleven different CEPs were used (6 with 2 components, 5 with 3 components). All CEPs